

國立高雄應用科技大學
九十七學年度碩士班招生考試
化學工程與材料工程系

准考證號碼 (考生必須填寫)

有機化學

試題 共 5 頁，第 1 頁

- 注意：a. 本試題共 25 題，每題 4 分，共 100 分。
b. 作答時不必抄題。
c. 考生作答前請詳閱答案卷之考生注意事項。

試題 共 5 頁，第 2 頁

1. Which has the smallest bond angle?

(a) CH_4 (b) H_2O (c) NH_3 (d) NH_4^+ .

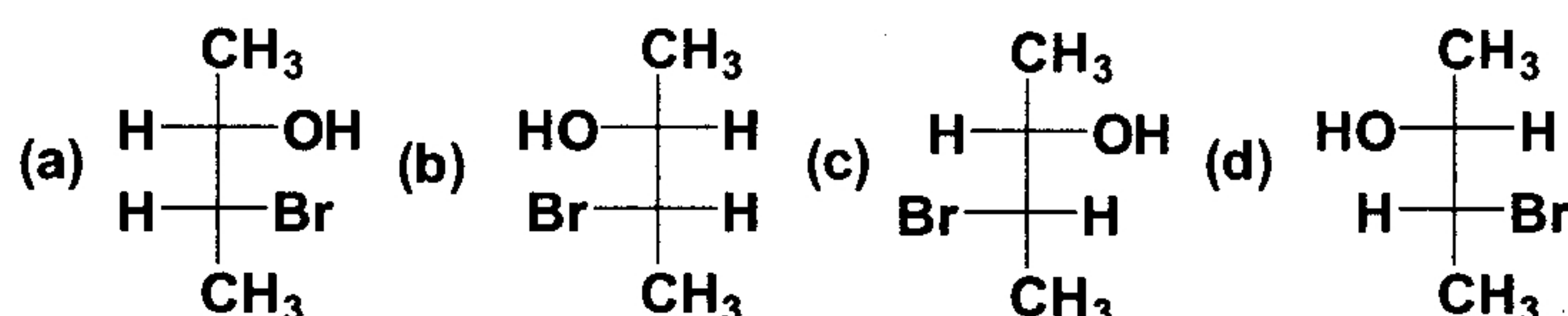
2. The following hydrogen halides, which has the biggest bond strength?

(a) H-F (b) H-Cl (c) H-Br (d) H-I .

3. Which has the smallest pK_a value?

(a) $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ (b) $\text{CH}_3\text{CH}_2\underset{\text{Br}}{\text{CH}_2}\text{COOH}$ (c) $\text{CH}_3\underset{\text{Br}}{\text{CH}_2}\text{CH}_2\text{COOH}$ (d) $\underset{\text{Br}}{\text{CH}_2}\text{CH}_2\text{CH}_2\text{COOH}$

4. Which one is the Fischer projection of (2R, 3R)-3-bromo-2-butanol?



5. Which molecule has a zero dipole moment?

(a) SO_2 (b) CO (c) CO_2 (d) CHCl_3 .

6. Which compound contains a secondary carbon atom?

(a) CH_4 (b) CH_3CH_3 (c) $\text{CH}_3\text{CH}_2\text{CH}_3$ (d) $(\text{CH}_3)_3\text{CH}$.

7. The carbon-carbon bond in following compound results from the overlap of which

orbitals (in the order C_1, C_2)? $\begin{array}{c} 2 \quad 1 \\ \text{H}_3\text{C} - \text{C} = \text{O} \\ | \\ \text{H} \end{array}$ (a) sp-sp^2 (b) sp-sp^3 (c) $\text{sp}^3\text{-sp}^3$ (d) $\text{sp}^2\text{-sp}^3$.

8. The IR spectrum of which type of compound generally exhibits evidence of hydrogen bonding?

(a) Aldehyde (b) Carboxylic acid (c) Ester (d) Ketone.

9. Which of the following is not a Lewis base?

(a) NH_3 (b) H_2O (c) BF_3 (d) H_2 .

10. Which is a protic solvent?

(a) CCl_4 (b) CH_3OH (c) $\text{CH}_3\text{CH}_2\text{OCH}_3$ (d) $\text{CH}_3\text{CH}_2\text{CH}_3$.

11. The basic species are arranged in decreasing order of basicity in the sequence:

試題 共 5 頁，第 3 頁

- (a) $\text{F}^- > \text{OCH}_3^- > \text{NH}_2^- > \text{CH}_3\text{CH}_2^-$
 (b) $\text{OCH}_3^- > \text{CH}_3\text{CH}_2^- > \text{NH}_2^- > \text{F}^-$
 (c) $\text{CH}_3\text{CH}_2^- > \text{NH}_2^- > \text{OCH}_3^- > \text{F}^-$
 (d) $\text{NH}_2^- > \text{CH}_3\text{CH}_2^- > \text{F}^- > \text{OCH}_3^-$

12. Which cycloalkane has the greatest ring strain?

- (a) Cyclopentane (b) Cyclohexane (c) Cycloheptane (d) Cyclopropane.

13. Treating $(\text{CH}_3)_3\text{C}-\text{Br}$ with a mixture of H_2O and CH_3OH at room temperature would yield:

- (a) $\text{CH}_2=\text{C}(\text{CH}_3)_2$ (b) $(\text{CH}_3)_3\text{C}-\text{OH}$ (c) $(\text{CH}_3)_3\text{C}-\text{OCH}_3$ (d) All of these (e) None of these.

14. Which is the strongest nucleophile for an $\text{S}_\text{N}2$ reaction?

- (a) RO^- (b) H_2O (c) RCO_2^- (d) ROH

15. Which alkyl halide would you expect to undergo $\text{S}_\text{N}1$ hydrolysis most rapidly?

- (a) $(\text{CH}_3)_3\text{C}-\text{I}$ (b) $(\text{CH}_3)_3\text{C}-\text{Br}$ (c) $(\text{CH}_3)_3\text{C}-\text{Cl}$ (d) $(\text{CH}_3)_3\text{C}-\text{F}$.

16. Which one of the following alcohols would dehydrate most rapidly when treated with sulfuric acid?

- (a) $\begin{array}{c} \text{C} \quad \text{C} \\ | \quad | \\ \text{C}-\text{C}-\text{C} \\ | \\ \text{OH} \end{array}$ (b) $\begin{array}{c} \text{C} \\ | \\ \text{C}-\text{C}-\text{C}-\text{C}-\text{OH} \\ | \\ \text{C} \end{array}$ (c) $\begin{array}{c} \text{C} \\ | \\ \text{C}-\text{C}-\text{C}-\text{C}-\text{OH} \\ | \\ \text{C} \end{array}$ (d) $\begin{array}{c} \text{C} \\ | \\ \text{C}-\text{C}-\text{C}-\text{C}-\text{OH} \\ | \\ \text{C} \end{array}$

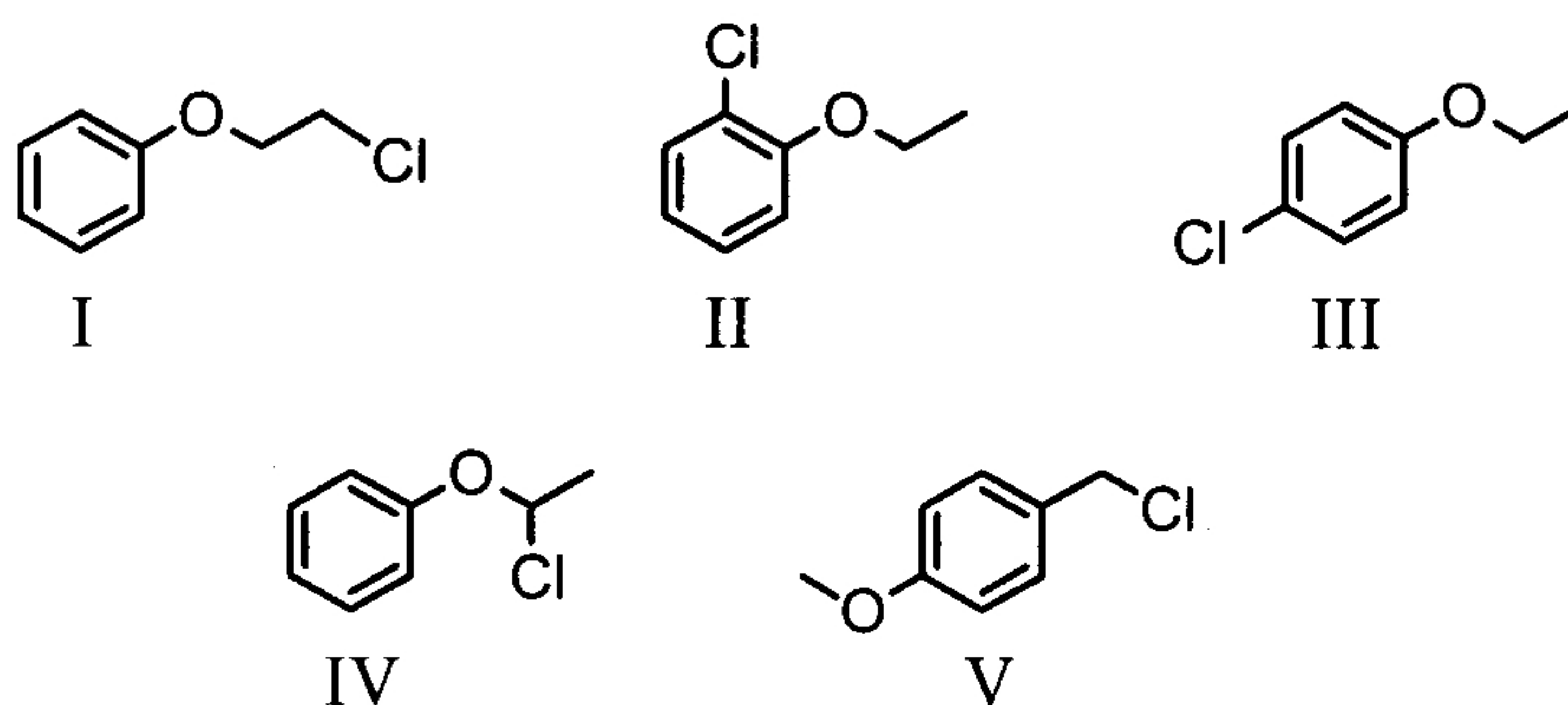
17. The ozonolysis (followed by hydrolysis) of an unsymmetrical and unbranched alkene forms:

- (a) a single aldehyde (b) an aldehyde and a ketone (c) two different ketones (d) two different aldehydes.

18. A compound with the molecular formula $\text{C}_8\text{H}_9\text{ClO}$ gave the following ^1H NMR spectrum:

triplet, $\delta=3.7$, triplet, $\delta=4.2$, multiplet, $\delta=7.1$

There was no evidence of an $-\text{OH}$ band in the IR spectrum. The most likely structure for the compound is:

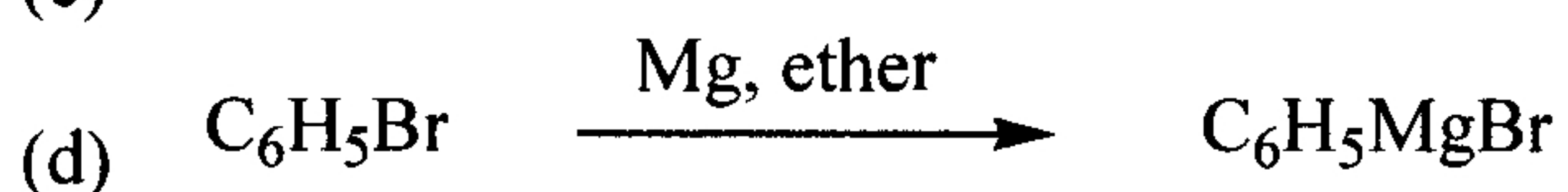
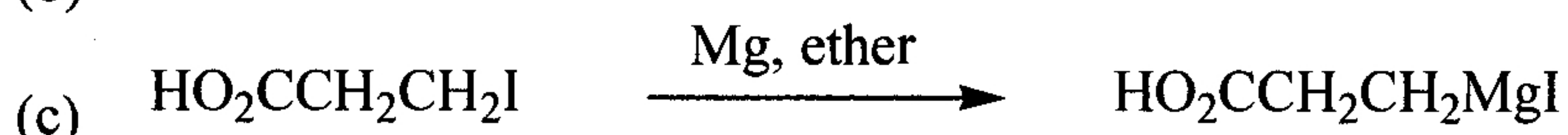
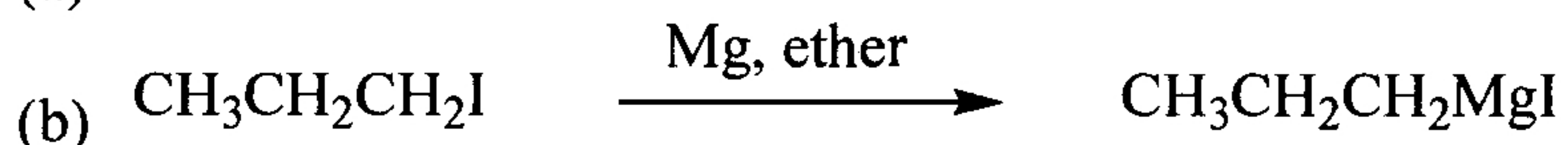
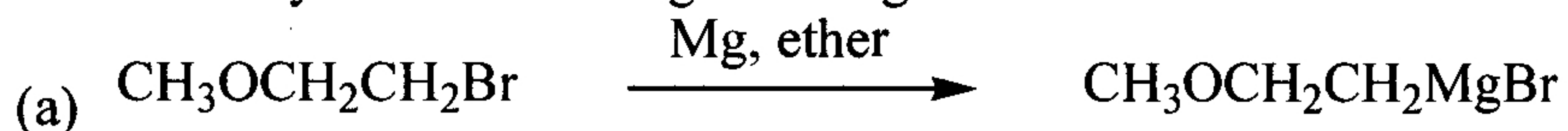


(a) I (b) II (c) III (d) IV (e) V.

19. Which of the reagents listed below would serve as the basis for a simple chemical test to distinguish between $(\text{CH}_3)_3\text{COH}$ and $(\text{CH}_3)_2\text{CHCH}_2\text{OH}$?

(a) NaH (b) NaOH/ H_2O (c) CrO_3 in H_2SO_4 (d) Br_2 in CCl_4 .

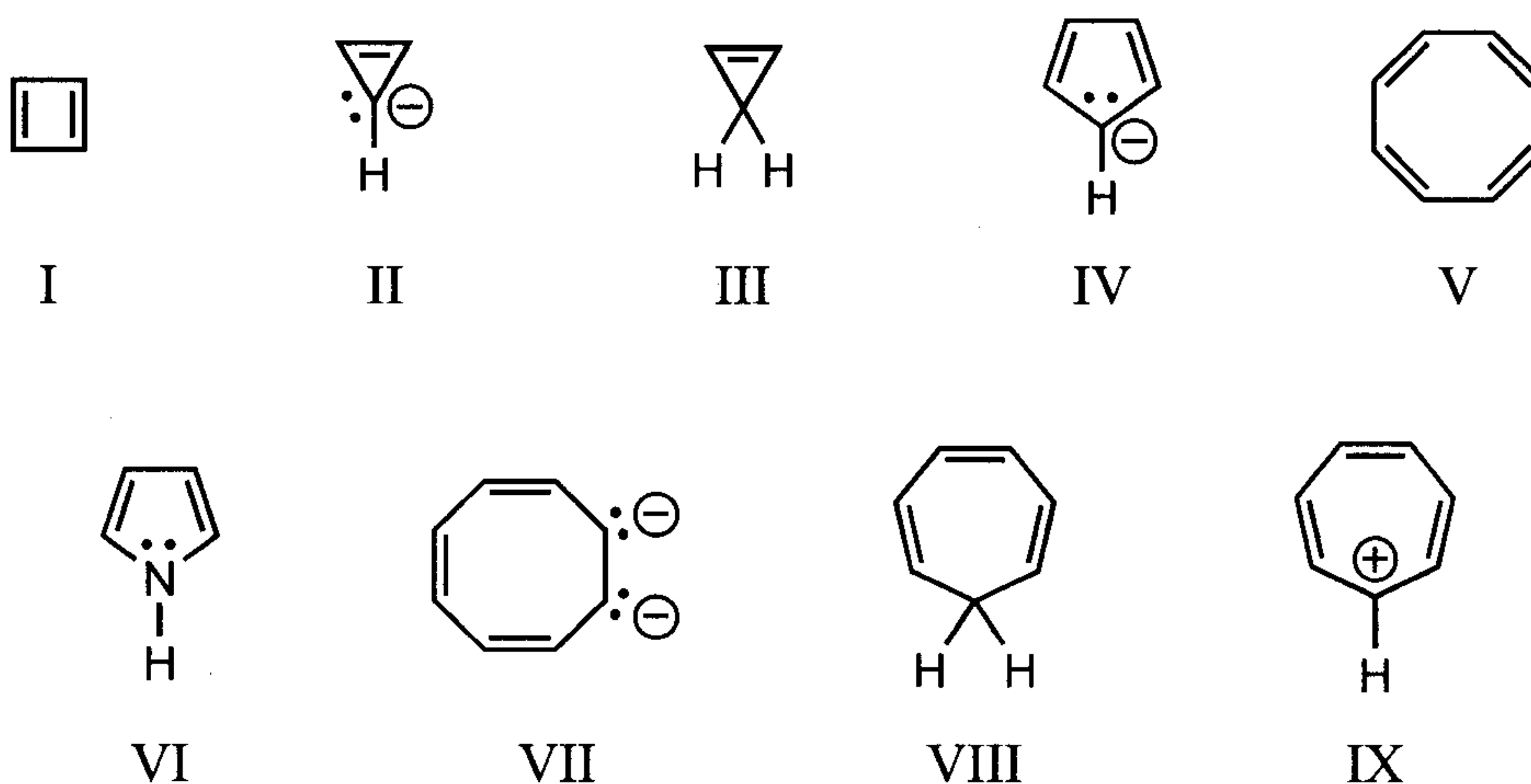
20. Which synthesis of a Grignard reagent would fail to occur as written?



21. Which of these dienes can undergo the Diels-Alder reaction?

(a) 1,2-Heptadiene (b) 1,3-Heptadiene (c) 1,4-Heptadiene (d) 1,5-Heptadiene.

22. On the basis of molecular orbital theory and Huckel's rule, which molecules and/or ions should be aromatic?

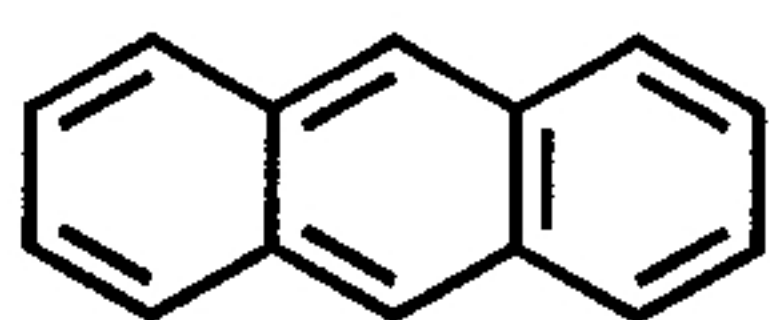


(a) I and V (b) III and VIII (c) IV, VII and IX (d) IV, VI, VII and IX (e) All of the structures, I-IX.

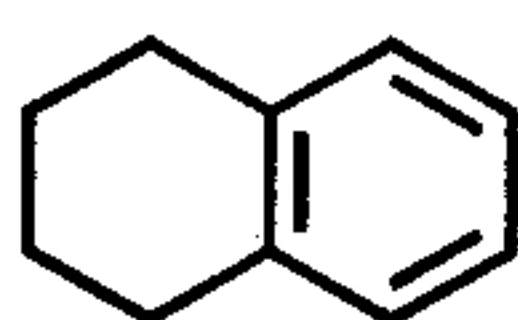
23. Which of these compounds absorbs at the longest wavelength in the UV-visible region?



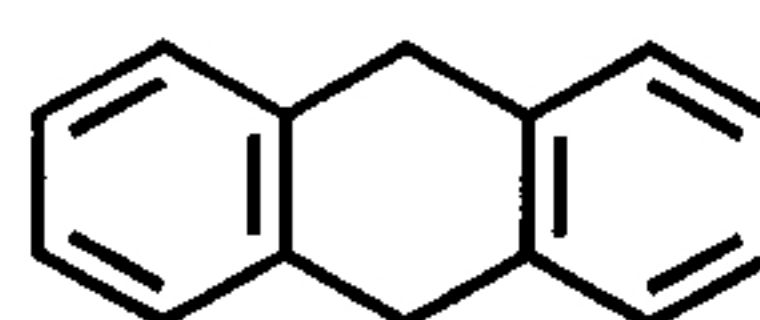
I



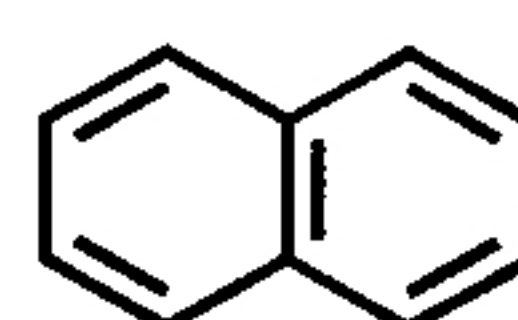
II



III



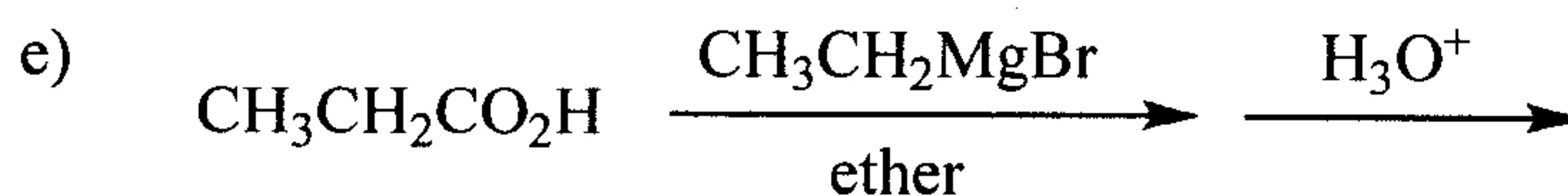
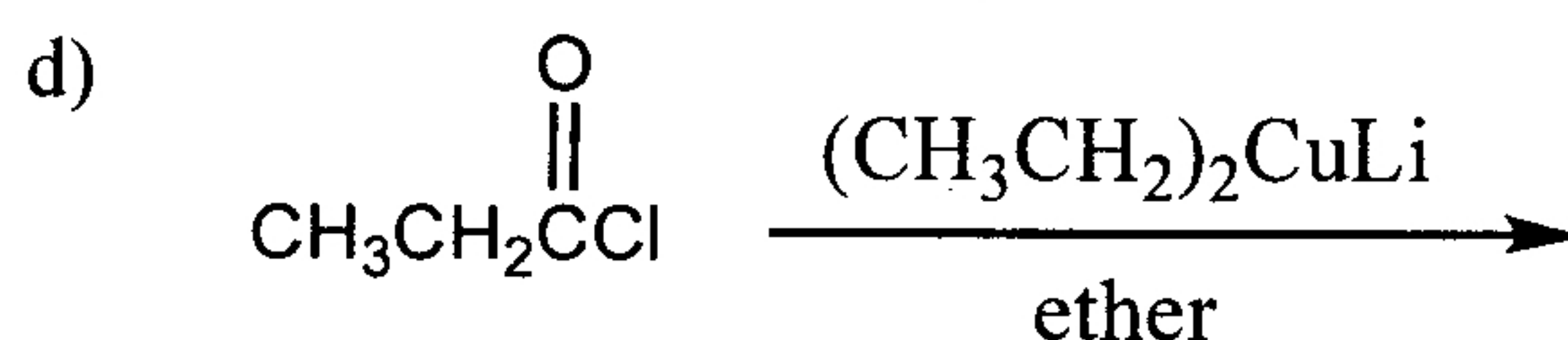
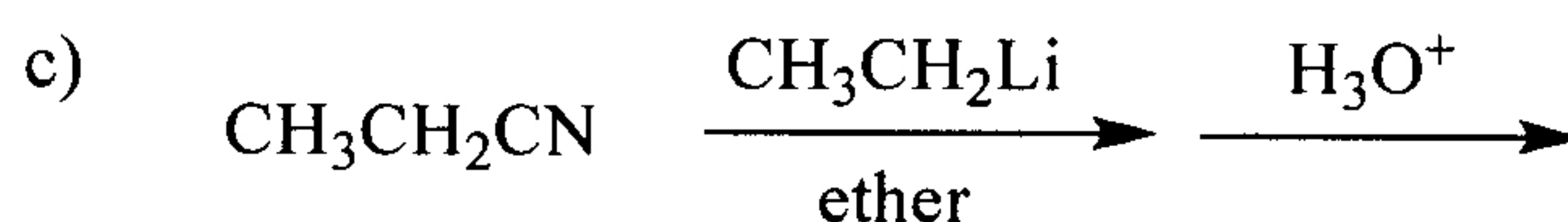
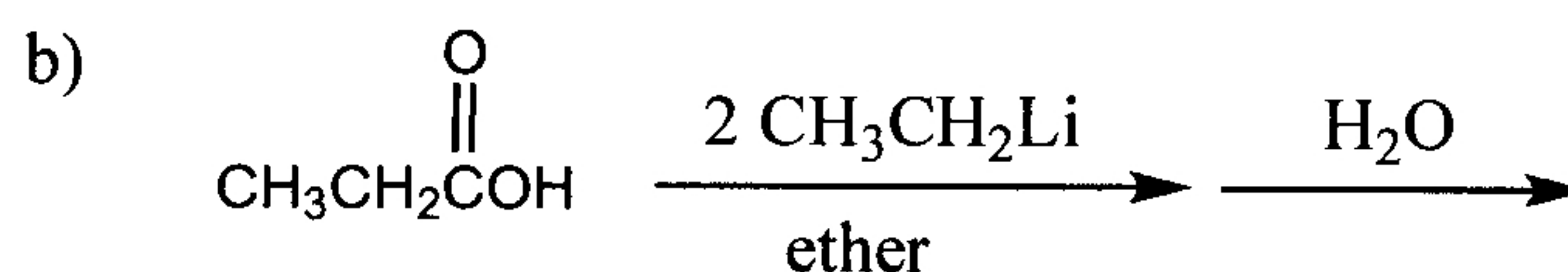
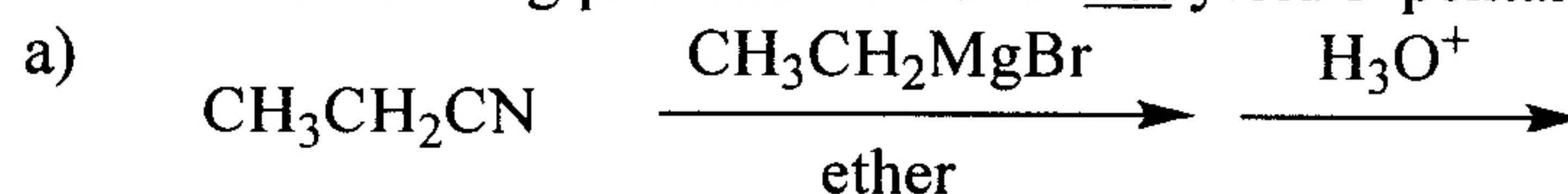
IV



V

(a) I (b) II (c) III (d) IV (e) V.

24. Which of the following procedures would not yield 3-pentanone as a major product?



25. Which of these combinations will not produce benzoic acid?

